June 26, 2016

Vermont Public Service Board
112 State Street
Montpelier, VT 05620-2701

Re: Temporary Sound Level Standards

Dear Public Service Board members,

We are relieved that the legislature has directed the Public Service Board to implement safer, albeit temporary sound standards for industrial wind projects.

When notified of our proposed project we did not jump to conclusions. As Presidents of the Fairfield Pond Recreation Association with an upcoming meeting we invited Dustin Lang from Rocky Ridge and Martha Statkus of VERA to both present at our annual meeting. Following the meeting it did not take much research to realize that something was very wrong with the way industrial wind was affecting people, not only in Vermont and the USA, but all around the world.

We live on the impaired water body of Fairfield Pond, east of Rocky Ridge where the Swanton Wind project would be located. Our home is 1.8 miles away from the proposed seven (7) 500' turbines. The sound expert used by VERA, Ken Kaliski from Resource Systems Group (RSG), stated at the Swanton Wind Open House that since we live across the water we would subtract the distance of the water for actual "feels like" distance from the turbines. We are situated northeast of the project, downwind of the prevailing south/southwest winds, an open shot of nothing between us and the project, except water. Anyone who has ever spent time on the water, especially a small lake/pond knows how much sound travels. There is .8 of a mile of water between us, so in reality we would be 1 mile from the project. Although this is further than homes on Rocky Ridge, an unprecedented 1,800-2,000 feet, with the open water and prevailing winds, and documented suffering from those even further than us, there is no doubt that our life would change dramatically. In thinking back to that hot, steamy Father's Day we were so thankful for the stiff breeze making it comfortable. When looking up across the Pond towards Rocky Ridge it was sad to think that we would dread any breeze in the future, unless much safer standards are put into place.

This link below is a literature review of sound propagation over water.
http://psb.vermont.gov/sites/psb/files/docket/7628LowellWind/Testimony%20&%20Exhibits/Other_Parties'_Prefiled&Exh/AlbanyTown/Exh_ALB-RJ-2.pdf. An excerpt from this report states:

"The science of noise from off-shore wind turbines has been reviewed by Sondergaard and Plovsing (SP) in a report to the Danish Ministry of the Environment:
http://www2.mst.dk/udgiv/publications/2005/87-7614-687-1/pdf/87-7614-689-8.pdf

The report consists of two parts: (a) measurement of emission of offshore turbine noise and (b) calculation of sound propagation from offshore turbines.

This review of the work of SP and the measurements made by Boué and the above analysis makes clear that a 5 km setback of wind turbines from rural shorelines is inadequate from an acoustic perspective. The estimated sound pressure level, 44 dBA on average and 49 dBA and above for 10% of the time, is far in excess of the typical night-time background sound pressure level, the present Ontario wind turbine noise limit of 40 dBA and the more realistic 35 dBA German night-time limit.

The 2007 final report by Mathieu Boué for the Swedish Energy Agency came to my attention after my submission to the EBR on September 5th. This is an important report because it includes measurements on the propagation of sound across open water. This report is therefore vital to the establishment of regulations for off-shore wind turbines. A link to the report is: http://www.elforsk.se/Global/Vindforsk/Rapporter%20fran%20Vindforsk%20II/V-201_TRANS_webb.pdf"

On October 3, 2015 Georgia Mountain Community Wind held an open house. Bruce and I attended, but first stopped in at Scott & Melodie McLanes on Georgia Mountain Road. The turbines were roaring that morning and after only a few minutes standing on their porch we could feel the "whomp, whomp, whomp" in our chests. Within a very short time we felt uneasy. Several people were there, each experiencing their own symptoms of uneasiness. We do not recall the exact snapshot reading on their professionally calibrated machine, but believe it was around 40 dBA. Strangely, at the top of the mountain for the tour, the turbines were much quieter, except for the motors humming and a light whoosh of the blades which did not appear to be spinning anywhere near as fast as they were earlier that morning. Most notable on the top of the mountain was the shadow flicker that spread out for miles across the valley. This confirmed our many readings from around the world that you suffer more at a greater distance away from them, downwind, and across open topography. It also confirmed why people who have only taken the time to learn about industrial wind from an open house are not getting a complete experience of the suffering happening for many Vermonters.

We were pleased that Senator Brian Campion took the time to experience what the McLanes have lived with for years. Upon doing so his comments were, "However, while outside, I have no other way to qualify my experience than sharing that I found the sound made by the turbines as too loud and not likely conducive to my being comfortable outdoors for an extended period of time." The Department of Public Service has also acknowledged that the McLane complaints and many others are not fabricated or exaggerated. They further state that it's indicative of a significant impairment of the quality of life for some nearby residents, yet does not support a finding of a public health impact. We ask you, what does it take to quantify Vermonters suffering? There is documented proof submitted over the years by outside, independent experts confirming that the current standards are too high for health and safety. Swanton Wind would be the largest turbines in Vermont, situated closest to homes yet. The Vermont Comprehensive Energy Plan states that we need to learn from the existing projects in Vermont. And that brings us to this rulemaking.

Too many people are suffering. We cannot continue the status quo of 45 dBA averaged over an hour, allowing decibels to surge to 70 dBA every 5 minutes and still meet the standard and 30 dBA inside, open bedroom window averaged over an hour.

To prevent further suffering and continued complaints for future proposed projects we suggest 35 dBA LMax outside, and 30 dBA LMax interior. Sleep disturbance is a serious health issue that is of paramount concern and protecting the interior of a home needs to be a priority. The temporary standard and future permanent standard must be both stricter and enforceable. A Max standard is one that is easier to measure, therefore easier to enforce, allowing for third-party transparent continuous sound monitoring that would shift the burden of enforcement from the neighbors to the State and developers, where it belongs. Violations should be dealt with promptly, increasing the penalty for every successive violation. No standard is worth the paper it's written on unless it is enforced. The current system has allowed developers to not even return calls for up to a week.

Attached is a .pdf compiled by Wayne C. Spiggle, M.D., wspiggle@mac.com, titled "What Established Science Tells Us About The Health Impacts of Grid Scale Wind Turbines and Why The Precautionary Principle Should Drive Public Policy On The Issue"

An excerpt from that report states that: "Jurisdictions in the United States are also realizing that large wind turbine installations are harmful and people are beginning to resist their placement:

*In November 2014, after five years of study and experience the Brown County Board of Health declared the Shirley Wind project in Wisconsin to be a "human health hazard". The now resigned director of the Brown County Health Department refused to accept the conclusion of the Board of Health. On May 18, 2016 the matter was referred to the Brown County Board of Supervisors. The results of this review are pending. (13)

*Many local jurisdictions are establishing safer setbacks: Umatilia County, Oregon, and Riverside, California have ordinances stipulating a setback of 10,561 ft.
*Catarunk, Main and Moscow, Maine - 8,000 ft.
*13 times the turbine height - Montville, Maine and Buckfield, Maine.
* 6,000 ft - Fayette County"

Please consider these setback distances as an option in your deliberations. You would have to determine what setback distance would equal a 35 dBA LMax outside and 30 dBA LMax interior.

The link below is a brief article by the Society for Neuroscience titled "What Happens To Your Brain When You Are Sleep Deprived" .

http://www.brainfacts.org/about-neuroscience/ask-an-expert/articles/2015/what-happens-to-your-brain-when-you-are-sleep-deprived/

As depicted below, Vermont ranks 9th. Let's make Vermont proud to be the leader it had always been in protecting and caring about its citizens, in putting the good of the people first and foremost.

Worldwide Noise Standards for Wind Turbines

Vermont Needs to Set the Safest Standards To Protect Citizens

1) France - Below 25 dBA, within residences around

2) New South Wales, South Australia, Tasmania, Victoria, and Western Australia - maximum of 35 dBA or 5 dBA above existing background noise, avg. over 10 min.

3) Denmark - 37 dBA limit in quite areas, maximum

4) Germany - 35 dBA nighttime exterior

5) Sweden - 40 dBA sound limit, environments with low background noise may be 35dBA

6) NH - not to exceed 40 dBA or 5 dBA above background night levels and 45 dBA or 5 dBA above background day levels.

7) Maine - not to exceed 42 dBA at night, over 10 minutes

8) Ireland - 43 dBA night limit and 45 dBA day limit or 5dBA above background noise, with a 35-40 dBA, with a 35-40 dBA avg. over 10 min. in quiet rural or residential areas

9) **Vermont** - 45 dBA outside averaged over an hour, allowing decibels to jump to 70 dBA every 5 minutes and still meet the standard. 30 dBA inside, open bedroom window averaged over one hour.

Typical background nighttime noise levels in rural areas of Vermont experiencing wind turbine development: 20 dBA. Complaints are well known to occur when noise levels exceed 10 dBA above background.

Once again, we are relieved that the Public Service Board will be setting new, safer, sound standards.

Respectfully submitted,

Sally and Bruce Collopy

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WHAT ESTABLISHED SCIENCE TELLS US ABOUT THE HEALTH IMPACTS OF GRID SCALE WIND TURBINES

AND WHY THE PRECAUTIONARY PRINCIPLE SHOULD DRIVE PUBLIC POLICY ON THIS ISSUE

June 8, 2016 Compiled by Wayne C. Spiggle, M.D.
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- **LIVING IN PROXIMITY TO WIND TURBINES DOES CAUSE DISEASE:**
  - The World Health Organization (WHO - Europe) found that residents living within 6500 feet of a turbine feel an overall diminished quality of life. Those exposed to turbine noise at 5000 feet also experienced significantly lower sleep quality and rated their environment as less restful. They concluded that data strongly suggests that wind turbine noise can negatively impact quality of life. (1)

  - The Institute of Medicine (IOM) policy points out that: "Sleep disorders and sleep deprivation are an unmet public health problem." (2)

  - Many prestigious medical centers, including Harvard University have cautioned "In the short term, a lack of adequate sleep can affect judgment, mood, ability to learn and retain information, and may increase the risk of serious accidents and injury. In the long term, chronic sleep deprivation may lead to a host of health problems including obesity, diabetes, cardiovascular disease, and even early mortality." Research has overturned the dogma that sleep loss has no health effects, apart from daytime sleepiness.(3)

  - Children and teens are particularly susceptible to sleep deprivation. A study published in the Journal of The American Academy of Child and Adolescent Psychiatry, found a strong link between sleep and aggression, delinquent behavior, and attention problems among 7- to 12-year-old children. (4)

- The prestigious WHO has cited numerous studies showing that sleep deprived children can be less reflective, more impulsive and hyperactive and show poorer attention span. WHO also accepts the research that some children and teens show reduced academic performance and learning when exposed to fractured sleep. One such study is referenced. It concludes: "Observational and experimental studies have shown that noise exposure leads to annoyance, disturbs sleep and causes daytime sleepiness, affects patient outcomes and staff performance in hospitals, increases the occurrence of hypertension and cardiovascular disease, and impairs cognitive performance in schoolchildren." (5)

- The WHO notes that outside noise of 30 to 40 decibels (dB) may cause some harm to children and the elderly; but above 55 dB the situation is considered increasingly dangerous for public health. WHO night noise guideline for safe sleeping indoors is 30 dB. (6)

- A 2014 article published on line by PLoS One, (claims to be a peer-reviewed open access journal), documented that exposure to wind turbine noise does increase the risk of sleep disturbance in a dose-response relationship. Of the many other claimed health effects of wind turbine noise exposure reported in the literature, they could find no conclusive evidence. The article cited the need for future study. (7)

- A peer reviewed article published recently in the Canadian Journal of Rural Medicine came to this conclusion:

"Conclusion: If placed too close to residents, IWTs (industrial wind turbines) can negatively affect the physical, mental and social well-being of people. There is sufficient evidence to support the conclusion that noise from audible IWTs is a potential cause of health effects. Inaudible low-frequency noise and infrasound from IWTs cannot be ruled out as plausible causes of health effects. " (8)

- **WHY DOES PUBLIC POLICY GENERALLY ALLOW WIND TURBINES TO BE CLOSE ENOUGH TO HOMES TO CAUSE HARM?**
    - Until recently, most information about grid scale wind has come from industry sources. Like the tobacco industry of a few decades ago, this industry has been quite disingenuous and successful in contending that there is no scientific evidence that exposure to wind turbine noise causes disease.

    - Reports on wind development written for the government tend not to address health effects on people living in the vicinity of turbines.

    - As a result, very few members of the public, including policy makers, are aware the significant physical and mental harm of people living close to wind turbines.

- **THE PUBLIC HEALTH PROFESSION IS TRYING TO CORRECT THIS SITUATION.**
    - For the last 15 years or so, the public health profession has reported how wind turbines harm human health (see above) and has endorsed the **Precautionary Principle** to respond to the many technological events that are becoming part of the experience of society. (9)

    - According to the precautionary principle, the burden of proof is placed on the industry associated with the problem, not the people who are being aggrieved. Public policy is not deferred until absolute scientific proof is settled. The WHO puts it this way: "The Principle states that in the case of serious or irreversible threats to the health of humans or the ecosystem, acknowledged scientific uncertainty should not be used as a reason to postpone preventative measures". (10)

    - Precaution is at the heart of public health protection. For example, current regulations pertaining to tobacco, environmental lead and pharmaceuticals are based on precaution and prevention. Initially, especially with tobacco and lead related diseases, the tendency was to wait on scientific proof, with disastrous results.

- **POLICY MAKERS ARE BEGINNING TO RESPOND TO PUBLIC HEALTH PROFESSIONALS ON THE WIND TURBINE ISSUE.**

  The most important initiatives are to establish setbacks from turbines to residences that acknowledge what is known about the probability of sleep deprivation. This is particularly true in Europe where the experience with wind installations has been longer and the most pervasive:

  - The Bavarian government has a "10-H-law" that calls for a setback distance to the nearest residential area of ten times a turbine's total height. This is based on data that show sleep-depriving noise from turbines is a function of their height. A turbine 150 meters high (492 feet) would be kept 1500 meters (4921 feet) away from homes. In May, 2016, the Bavarian Constitutional Court affirmed this law. (11)

  - A second German state, Rhineland-Palatinate, (southern Germany) plans to impose a minimum of 1,100 meters (3609 feet) between wind developments and nearest housing.

  - Ireland has a bill that says the distance from a wind turbine to a house should be 10 times its height. (12)

  Jurisdictions in the United States are also realizing that large wind turbine installations are harmful and people are beginning to resist their placement:

  - In November 2014, after five years of study and experience the Brown County Board of Health declared the Shirley Wind project in Wisconsin to be a "human health hazard". The now resigned director of the Brown County Health Department refused to accept the conclusion of the Board of Health. On May 18, 2016 the matter was referred to the Brown County Board of Supervisors. The results of this review are pending. (13)

  - Many local jurisdictions are establishing safer setbacks:
    - Umatilia County, Oregon, and Riverside, California have ordinances stipulating a setback of 10,561 ft.

- Catarunk, Maine and Moscow, Maine – 8,000 ft.
- 13 times the turbine height – Montville, Maine and Buckfield, Maine.
- 6,000 ft. – Fayette County PA.
- 5,280 ft. – Trempealeau County, Wisconsin, Sumner, Maine & Hillsdale County, Michigan.

Other locales are sited in this reference. (14)

- In a letter to constituents dated May 19, 2016, Tennessee Senator Lamar Alexander shared the following information:
  - "In October, the residents of Irasburg, Vermont, voted 274 to 9 against a plan to install a pair of 500 foot turbines on a ridgeline visible from their neighborhoods."
  - "In New York, three counties opposed 500 to 600 foot wind turbines next to Lake Ontario"
  - In Kent County, Maryland, Apex Clean Energy, is trying to put down 25 to 35 500-foot turbines a quarter-to a half-mile apart across thousands of acres of farmland,"
  - "According to the Baltimore Sun, Stephen S. Hershey Jr., a local state legislator, introduced a bill that would give county officials the right to veto any large-scale wind project in their jurisdiction.

  Senator Alexander sent this newsletter to ask his constituents to oppose the proposed Crab Orchard Wind Project wind in Cumberland County, Tennessee. (15)

- There is now a proposal in the NC State Legislature that would provide a setback of at least 1 ½ miles from a neighboring property line. (16)

- In December 2015, the Board of Zoning Appeals, Allegany County, Maryland, unanimously denied an application for variances that would have placed the Dans Mountain Wind Project within 1000 feet from residences. (16)
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COMMENT

- Established science shows that wind turbines cause sleep depriving disease.

- Increasingly, jurisdictions are recognizing this and are developing setbacks for wind turbines that protect the public health. A distance of 10 times the height of the turbine to the nearest residence is emerging as a safe setback, while lesser distances fail to protect the public health.

- Until such regulations become the norm, people who live adjacent to wind turbines will continue to suffer and public resistance to this industry can be expected to increase.

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(2) Institute of Medicine (IOM) Committee on Sleep Medicine and Research, Colten HR and Altevogt BM (ed.), **Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem**, Washington, DC: National Academy of Sciences, 2006.

(3) http://healthysleep.med.harvard.edu/healthy/matters/consequences

(4) **Sleep and Psychiatric Symptoms in School-Age Children**. Journal of American Academy of Child and Adolescent Psychiatry. 2000;39:502-508.

(5) Dr Mathias Basner, MD, Wolfgang Babisch, PhD, Prof Adrian Davis, PhD, Mark Brink PhD, Charlotte Clark, Phd, Sabrine Janssen, PhD, Prof Stephen Stansfeld, PhD: Auditory and non-auditory effects of noise on health, The Lancet, Volume 383, Issue 9925, 12-18, Page 1270.

(6) WHO –**Night Time Noise Guidelines for Europe**. http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf pp. 25 -28.

(7) <PLoS Onev.9(12); 2014PMC4256253>

(8) Jeffery, Roy D. MD, Krogh, Carmen M.E., Horner, Brett BA, CMA: **Industrial wind turbines and adverse health effects**. Canadian Journal of Rural Medicine, 2014;19(1)

(9) **How to Apply the Precautionary Principle to Wind Energy Projects.** Waubra Foundation. June 19, 2012. <docs.wind-

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(10) **The precautionary principle: protecting public health, the environment and the future of our children.** WHO-Europe, 2004. www.euro.sho.int/_data/assets/pdf_file/0003/91173/E83079.pdf

(11) *Süddeutsche Zeitung - Christian Sebald - May 9, 2016*

(12) http://www.oireachtas.ie/documents/bills28/bills/2014/1914/b1914d.pdf

(13) **Setbacks and noise regulations since 2010: <**Kirby Mountain.blogspot.com>

(14) **Xiong_Shirley_Wind_Decision_Discredited__BCCRWE_Requests_County_Board_Officially_Dismiss.pdf**

(15) **Alexander urges Cumberland County Residents, All Tennesseans to Oppose Proposed Wind Farm –** e-mail Newsletter, May 19, 2016 : lamar@alexander.senate.gov

(16) **NC Senate Bill 843: Renewable Energy Property Protection:** Sen. Bill Cook & Sen. Andrew Brock: <ncleg.net>

(17) **Wind farm developer denied in Allegany County: Cumberland Times-News** 11/17 2015 http://www.your4state.com/news/news/wind-farm-denied-in-allegany-county

ADDITIONAL BIBLIOGRAPHY

AHA white paper: (go to library section): **If Wishes were Fishes: An examination of the common assumptions about electricity generation from wind.** www.alleghenyhighlandsalliance.com

Ibid. (go to library): Living 1600 Feet from a Wind Turbine (video)